

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

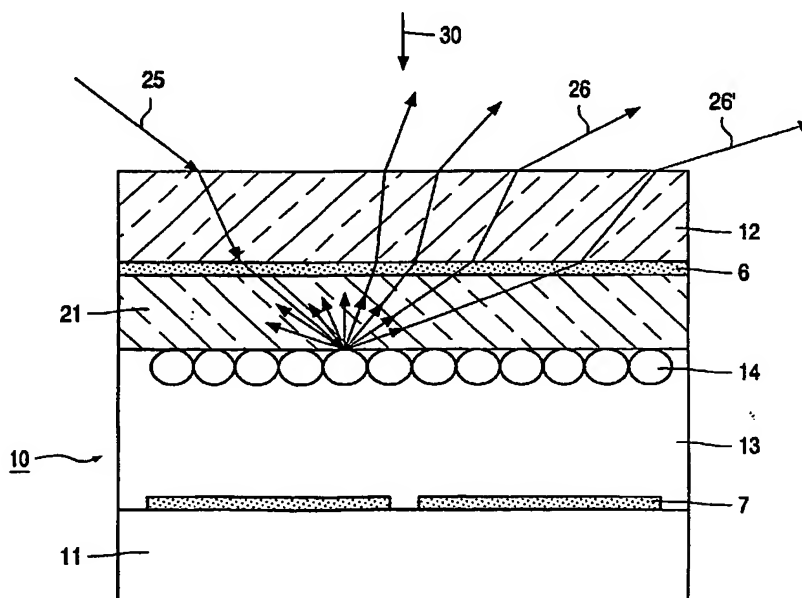
(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
30 October 2003 (30.10.2003)

PCT

(10) International Publication Number
WO 03/089983 A1

- (51) International Patent Classification⁷: **G02F 1/167**
- (21) International Application Number: **PCT/IB03/01101**
- (22) International Filing Date: **20 March 2003 (20.03.2003)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
02076558.2 22 April 2002 (22.04.2002) EP
- (71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]**; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): **CORNELISSEN, Hugo, J. [NL/NL]**; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL); **JOHNSON, Mark, T. [GB/NL]**; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (74) Agent: **DEGUELLE, Wilhelmus, H., G.**; Internationaal Octrooibureau B.V., Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report

[Continued on next page]

(54) Title: **ELECTRO-OPTICAL DISPLAY DEVICE**

(57) Abstract: The electro-optical display device has a translucent front wall (12) and at least one pixel (10) with an electro-optical medium, a scattering medium (14) and a switching electrode (6) associated with the front wall (12), and drive means via which the pixel (10) can be brought to different optical states. According to the invention, the pixel (10) comprises a low-refractive index material (21) with a refractive index n_{li} in the range from $1.0 \leq 1.44$. Preferably, the low-refractive index material (21) is provided between the switching electrode (6) and the electro-optical medium. Preferably, the electro-optical medium is an electro-phoretic medium or an electro-chromic medium. The electro-optical display device combines a high brightness with a wide viewing angle.

WO 03/089983 A1

WQ 03/089983 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

PCT/IB 03/01101

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G02F1/167

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 306 229 A (IBM) 30 Apr11 1997 (1997-04-30) claim 14 page 4, line 35 - line 40 figure 2	1-15
X	US 6 067 185 A (ALBERT JONATHAN D ET AL) 23 May 2000 (2000-05-23) column 15, line 45 - line 52	1-3,6,7, 9-12,14
E	WO 03 050607 A (E INK CORP) 19 June 2003 (2003-06-19) the whole document	1-15

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

7 July 2003

Date of mailing of the international search report

15/07/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

G111, R

INTERNATIONAL SEARCH REPORT

PCT/IB 03/01101

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
GB 2306229	A	30-04-1997	KR	245061 B1	15-02-2000
US 6067185	A	23-05-2000	US	2002089735 A1	11-07-2002
			US	6392785 B1	21-05-2002
			AU	9122598 A	16-03-1999
			AU	9206398 A	16-03-1999
			AU	9207898 A	16-03-1999
			BR	9814454 A	03-10-2000
			BR	9814455 A	03-10-2000
			BR	9814456 A	03-10-2000
			CA	2300827 A1	04-03-1999
			CA	2300830 A1	04-03-1999
			CA	2300849 A1	04-03-1999
			DE	69814410 D1	12-06-2003
			EP	1010035 A1	21-06-2000
			EP	1010036 A1	21-06-2000
			EP	1010037 A1	21-06-2000
			JP	2002504696 T	12-02-2002
			WO	9910767 A1	04-03-1999
			WO	9910768 A1	04-03-1999
			WO	9910769 A1	04-03-1999
			US	6252564 B1	26-06-2001
			US	6515649 B1	04-02-2003
			US	6120839 A	19-09-2000
			US	6118426 A	12-09-2000
			US	6262706 B1	17-07-2001
			US	6459418 B1	01-10-2002
			US	6017584 A	25-01-2000
			US	6177921 B1	23-01-2001
			US	6300932 B1	09-10-2001
			US	6232950 B1	15-05-2001
			US	2003034949 A1	20-02-2003
			US	2003112491 A1	19-06-2003
			US	6249271 B1	19-06-2001
			US	6535197 B1	18-03-2003
			US	2002018042 A1	14-02-2002
			AU	3190499 A	11-10-1999
			CA	2320788 A1	23-09-1999
			EP	1064584 A1	03-01-2001
			JP	2002507765 T	12-03-2002
			WO	9947970 A1	23-09-1999
			US	2003011868 A1	16-01-2003
			US	2003076573 A1	24-04-2003
			US	6445489 B1	03-09-2002
			AU	3767899 A	16-11-1999
			CA	2329173 A1	04-11-1999
			EP	1075670 A1	14-02-2001
			JP	2002513169 T	08-05-2002
			WO	9956171 A1	04-11-1999
			US	6130774 A	10-10-2000
			US	6172798 B1	09-01-2001
WO 03050607	A	19-06-2003	WO	03050607 A1	19-06-2003

Best Available Copy